

GRADE PLANE DETERMINATION WORKSHEET

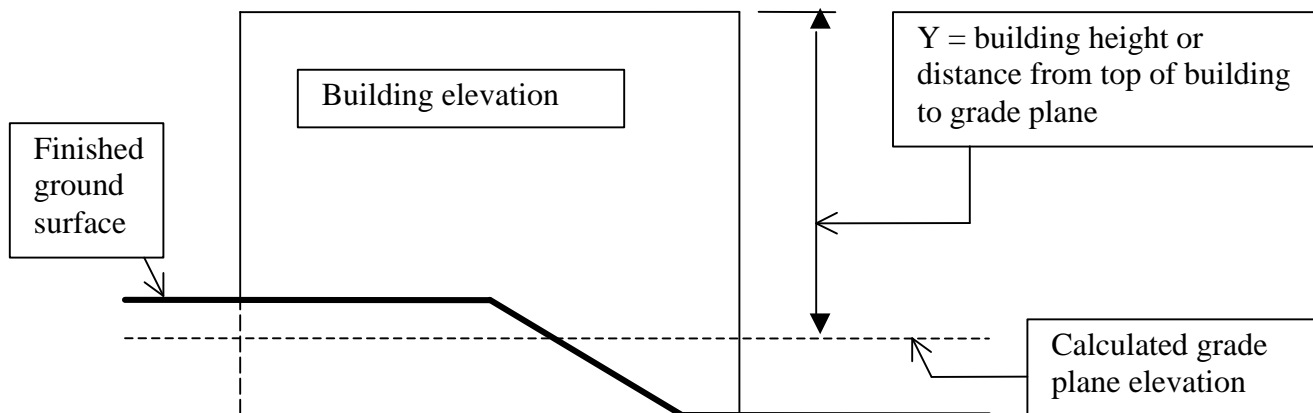
WALL DESIGNATION	WALL LENGTH	WALL AREA

Total of all wall lengths (building perimeter) = _____ Feet

Total of all wall areas from above table = _____ Square feet

Building height Y = (Total wall area / Total wall length) = _____ Feet

Permitted building height from Table 503 including modifications to building height within section 504 = _____ Feet *(This value must be equal to or greater than the value "Y" calculated above.)*



**INSTRUCTIONS FOR:
GRADE PLANE DETERMINATION WORKSHEET**

Three factors are required to determine the grade plane location of the building or facility. The factors are indicated in the worksheet Table as wall designation, wall length, and wall area. Two important pieces of information are provided from this worksheet, first being location of grade plane and second the building height.

Grade plane is defined in section 502.1 of the IBC as a reference plane representing the average of finished ground level adjoining the building at exterior walls. Where the finished ground slopes away from the exterior walls;

- The reference plane is established by the lowest points within the area between the building and the lot line, or
- Where the lot line is more than 6 feet from the building; the reference plane is established by the lowest points within the area between the building and such point 6 feet from the building.

The first column in the worksheet table is titled "wall designation" and is used to reference the individual wall being considered. All exterior walls of the building must be entered with a wall designation and must be accounted for within the table.

The second column is titled "wall length" and is the length of the wall being considered. Lengths of all walls need to be entered in the table. The wall lengths entered in this column are to be added giving us the total perimeter of the building. This value needs to be entered on the worksheet, designated as:

"Total of all wall lengths (building perimeter) = Feet".

Enter value here

The final column is titled "wall area" and is the actual area, above ground level, of the wall being considered. Please note that when the finished ground slopes away from the exterior wall, the calculated wall area shall also include the area of the wall below grade to lowest points within the area between the building and a point 6 feet from the building. Please also note that wall area could also include portions of roofs as illustrated in example # 2. The wall areas entered in this column are to be added and this value is to be entered on the worksheet in the area designated as:

"Total of all wall areas from above table = Square feet"

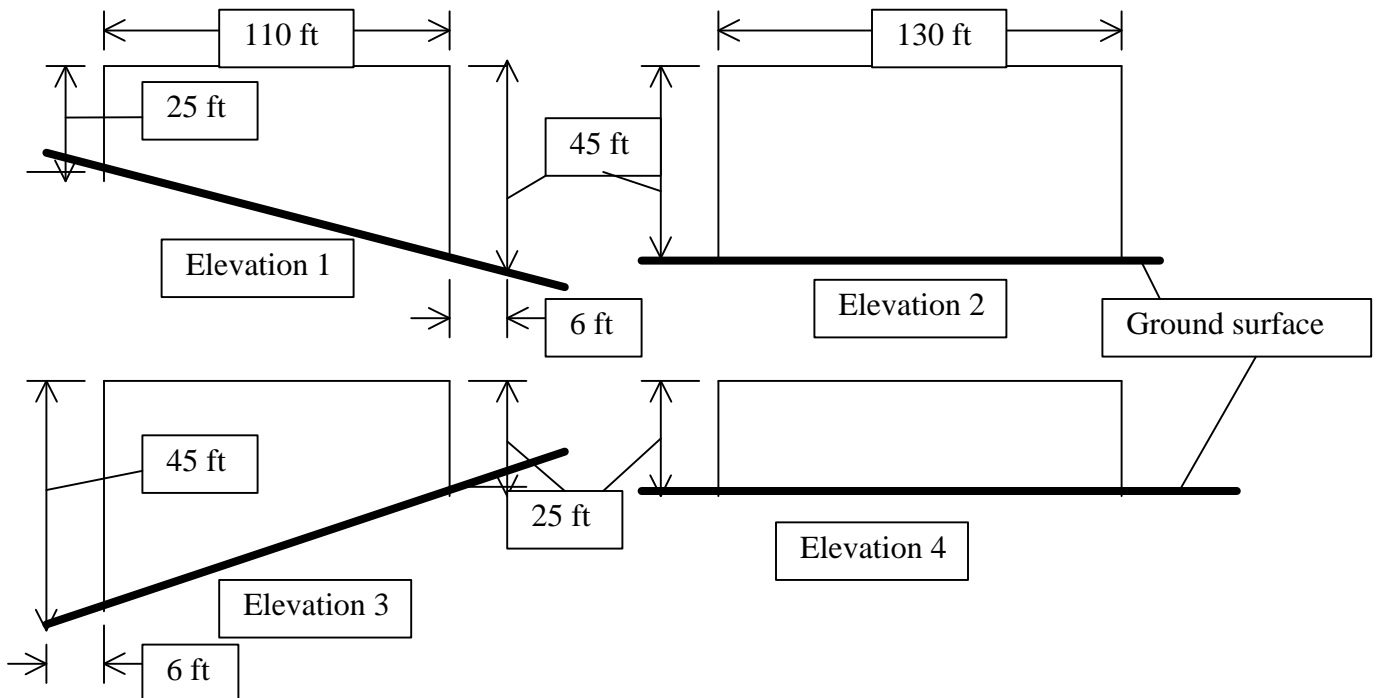
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The value of Y (distance from roof to grade plane elevation or distance from a reference plane to the grade plane elevation) is obtained by dividing the total wall area above ground level by the perimeter (sum of wall lengths) of the building.

Building height is defined in section 502.1 of the IBC as the vertical distance from grade plane to the average height of the highest roof surface. Building height is the distance from the top of the building to the grade plane location. It should be noted that when doing the calculation for grade plane any reference plane could be used to perform the wall area calculation. When determining the building height when we use a reference plane, other than the top of the building, we must add the distance from the reference plane to the top of the building to the distance from the reference plane to the grade plane. By using a reference plane in some instances makes the arithmetic simpler in performing the calculations.

The final step to be completed on this worksheet is to determine the allowable building height above grade plane that is permitted by Table 503 of the IBC. The allowable building height indicated in Table 503 is based on occupancy groups and type of construction being utilized. Section 504 of the IBC does allow the building height specified in the table to be increased by 20 feet for some occupancies when a complete automatic fire sprinkler system is being provided. The allowable building height based on Table 503 with any associated modifications from section 504 must be greater than or equal to the building height "Y" calculated above.

EXAMPLE NUMBER 1: Building is classified as a Group M occupancy.



WALL DESIGNATION	WALL LENGTH	WALL AREA
Elevation 1	110 feet	$(25 \times 110) + \left[\frac{(45 - 25)}{2} \times 110\right] = 3850$ square feet
Elevation 2	130 feet	$(130 \times 45) = 5850$ square feet
Elevation 3	110 feet	$(25 \times 110) + \left[\frac{(20)}{2} \times 110\right] = 3850$ square feet
Elevation 4	130 feet	$(130 \times 25) = 3250$ square feet

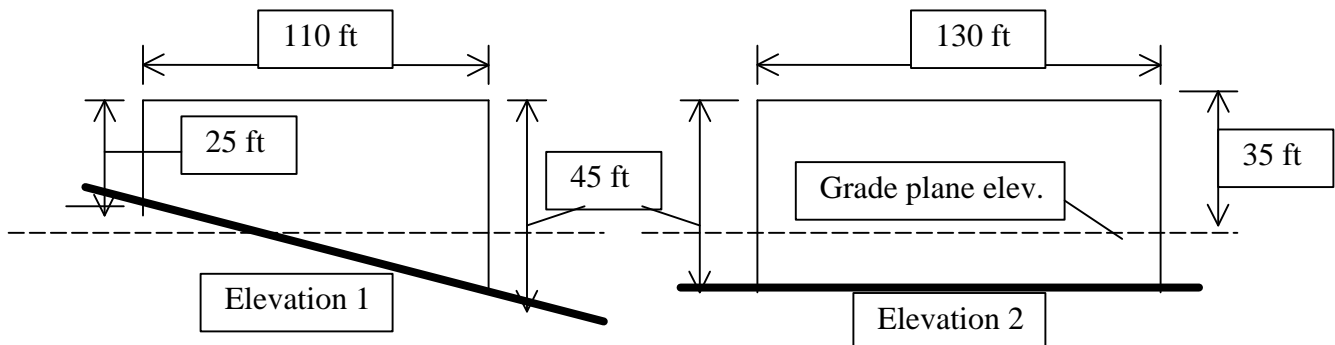
Total of all wall lengths (building perimeter) = 480 Feet

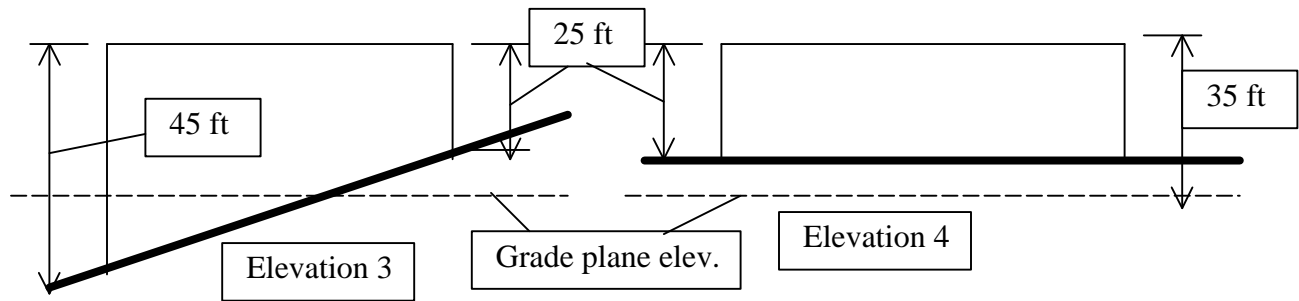
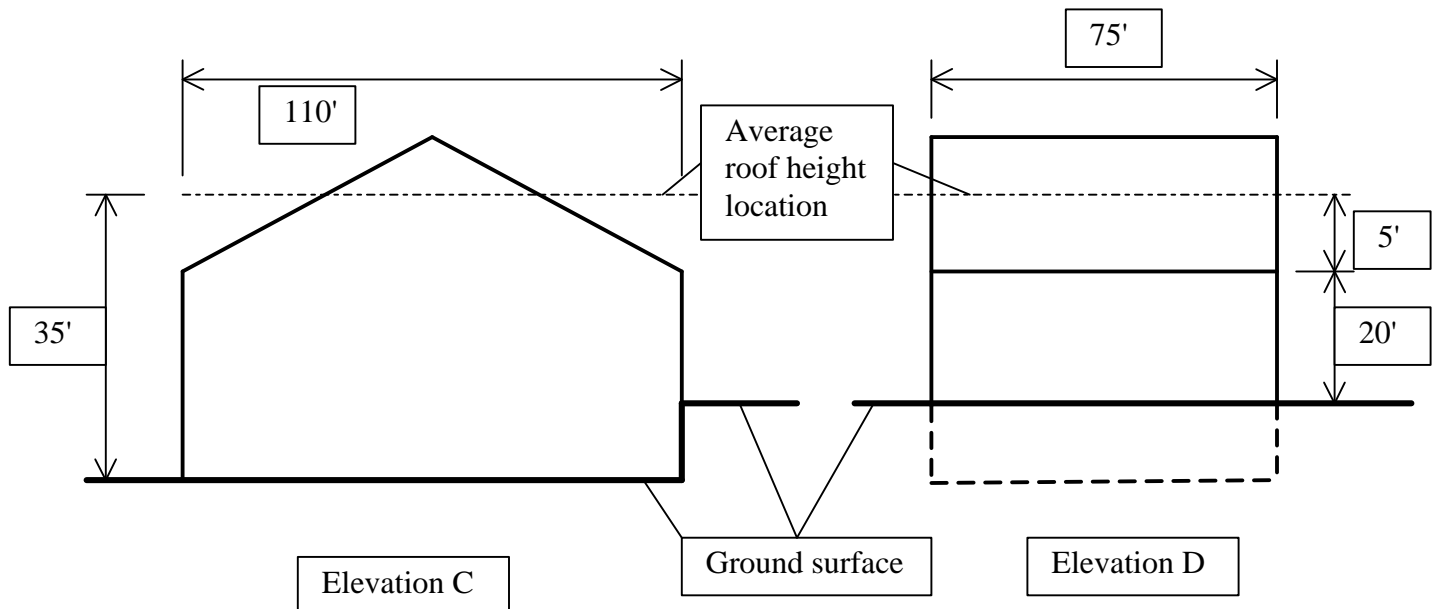
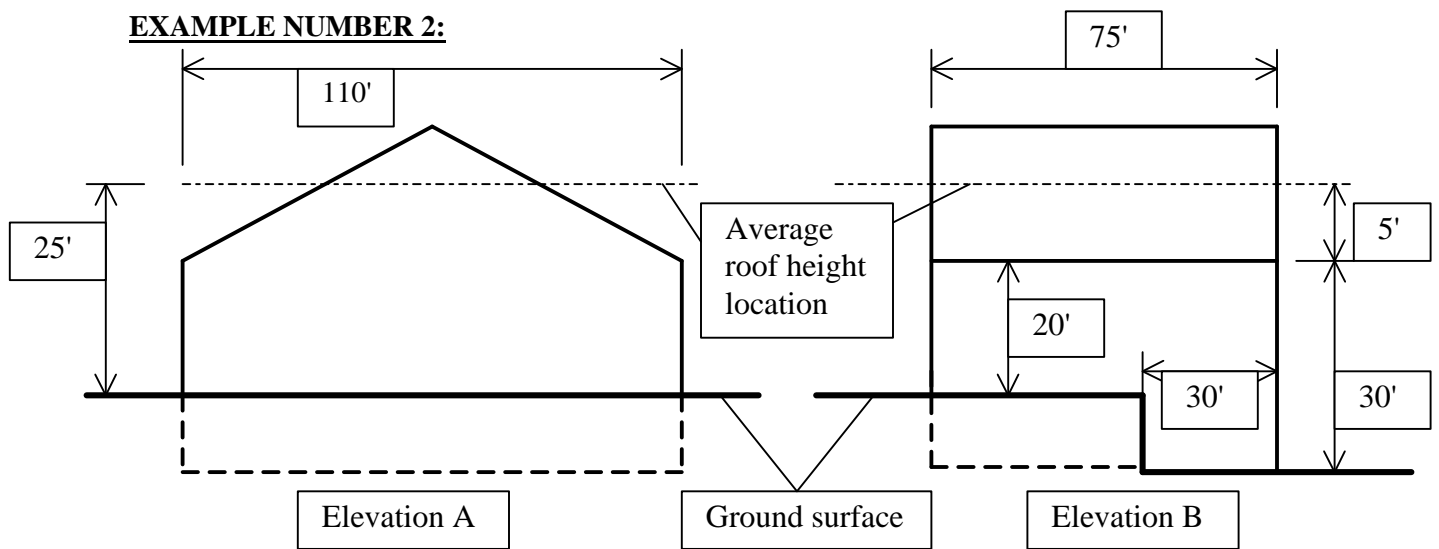
Total of all wall areas from above table = 16,800 Square feet

Building height Y = (Total wall area / Total wall length) = $(16800/480) = 35$ Feet (For this example the grade plane would be located 35 feet below the roof surface and 35 feet would also be the building height.)

Based on Table 503 of the IBC and assuming the building is not protected by an automatic fire sprinkler system, the building would be permitted to be any type of construction.

Permitted building height from Table 503 including modifications to building height within section 504 = 35 Feet (This value must be equal to or greater than the value "Y" calculated above.)



EXAMPLE NUMBER 1 (CONTINUED)**EXAMPLE NUMBER 2:**

WALL DESIGNATION	WALL LENGTH	WALL AREA
Elevation A	110 feet	$(110 \times 25) = 2750$ square feet
Elevation B	75 feet	$(75 \times 25) + [30 \times (35 - 25)] = 2175$ square feet
Elevation C	110 feet	$(110 \times 35) = 3850$ square feet
Elevation D	75 feet	$(75 \times 25) = 1875$ square feet

Total of all wall lengths (building perimeter) = 370 Feet

Total of all wall areas from above table = 10650 Square feet

Building height $Y = (\text{Total wall area} / \text{Total wall length}) = (10650/370) = \underline{28.8}$ Feet (For this example the grade plan would be located 28.8 feet (or 28'-9 5/8") below the average roof height location and 28.8 feet would also be the building height.)

Based on Table 503 of the IBC and assuming the building is not protected by an automatic fire sprinkler system, the building would be permitted to be any type of construction.

Permitted building height from Table 503 including modifications to building height within section 504 = Feet (This value must be equal to or greater than the value "Y" calculated above.)

